

## COURSE OUTLINE

### (1) GENERAL

SCHOOL			
ACADEMIC UNIT	Interdisciplinary Graduate Programme in the BRAIN and MIND sciences		
LEVEL OF STUDIES	7		
COURSE CODE	CS-475	SEMESTER	Spring
COURSE TITLE	Autonomous Robotic Navigation		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
<i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>			
lectures	4	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE	Special background		
<i>general background, special background, specialised general knowledge, skills development</i>			
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	<a href="https://elearn.uoc.gr/course/view.php?id=4437">https://elearn.uoc.gr/course/view.php?id=4437</a>		

### (2) LEARNING OUTCOMES

<p><b>Learning outcomes</b></p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul> <p><b>1. Knowledge:</b> Having attended and successfully completed the course, students will be able to describe how specific, selected problems in the broader field of autonomous robotic navigation are addressed in recent relevant literature.</p> <p><b>2. Understanding:</b> Having attended and successfully completed the course, students will have developed an in-depth understanding of the mechanisms used to solve specific autonomous robotic navigation problems and will be able to explain why these mechanisms are also adequate for solving other problems.</p> <p><b>3. Application:</b> Having attended and successfully completed the course, students will be able to reuse existing methodologies and tools to produce alternative solutions for specialized versions of specific autonomous robotic navigation problems or for the development of related applications.</p> <p><b>4. Analysis:</b> Having attended and successfully completed the course, students will be able to critically examine specific problems and recognize them as the synthesis of a series of smaller sub-problems.</p>
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**5. Synthesis:** Having attended and successfully completed the course, students will be able to combine individual tools and methodologies to solve complex autonomous robotic navigation problems.

**6. Evaluation:** Having attended and successfully completed the course, students will be able to measure and quantitatively assess the quality of solutions to autonomous robotic navigation problems and compare these solutions with other existing ones.

#### General Competences

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>
<i>Decision-making</i>	<i>Respect for the natural environment</i>
<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>.....</i>
<i>Production of new research ideas</i>	<i>Others...</i>
	<i>.....</i>

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Production of new research ideas
- Project planning and management
- Criticism and self-criticism

### (3) SYLLABUS

It includes the development, experimentation, and evaluation of methods for sensor data analysis, robot motion planning, robot control, and, more generally, topics related to the navigation of robotic systems. To achieve the course objectives, robotic system simulators and laboratory robotic systems are used.

## (1) TEACHING and LEARNING METHODS - EVALUATION

<p><b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i></p>	Face-to-face																							
<p><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<ul style="list-style-type: none"> <li>• Email</li> <li>• Course website</li> <li>• Electronic submission of assignments</li> <li>• e-Learn platform</li> </ul>																							
<p><b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity</i></th> <th style="text-align: center;"><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Tutorials</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Study</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Exercises/labs</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Final project</td> <td style="text-align: center;">8</td> </tr> <tr> <td>Exams</td> <td style="text-align: center;">4</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>Course total</td> <td style="text-align: center;"><b>168</b></td> </tr> </tbody> </table>		<i>Activity</i>	<i>Semester workload</i>	Lectures	52	Tutorials	0	Study	52	Exercises/labs	52	Final project	8	Exams	4							Course total	<b>168</b>
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<p><b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Class attendance/participation Exercises/projects Oral/written exams</p> <p>Students are informed about the evaluation process during the first lecture of the course. It is also made available on the course website.</p>																							

## (2) ATTACHED BIBLIOGRAPHY

<ul style="list-style-type: none"> <li>• Selected research publications</li> <li>• S. Thrun, W. Burgard, D. Fox, Probabilistic Robotics, MIT Press, 2005.</li> <li>• H. Choset, K.M. Lynch, S. Hutchinson, G.A. Kantor, W. Burgard, L. Kavraki, S. Thrun, Principles of Robot Motion, MIT Press, 2005.</li> <li>• Lecture/presentation slides</li> <li>• Selected online sources</li> </ul>
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